



Disclosure of Invention

This is an important legal document. See definitions of asterisked terms. The form should be carefully completed by inventor(s) with the appropriate copies forwarded to the Patent Representative.

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LEGAL DEPARTMENT

Descriptive Title of Invention: Reducing Dark Current Of Photoconductors Using Heterojunctions That Have A High Energy Sensitivity

List all inventors, include full middle names. Use attached sheet if more than one inventor

Name & Title of Inventor(s) Larry Partain, Advanced Tech Mgr	Badge # 38590	Home Telc phone# 650-941-7531	Country of Citizenship USA
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Home Address/Street 590 Milverton Road	City Los Altos	State CA	Zip 94022
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Business Unit Name Gintzon Technology Center	Business Unit Address 2599 Garcia, Mountain View, CA 94043
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Stage of Development>(*see definitions)	Date (Mo/Yr)	Location	Identify Persons or Supporting acts Stated in 4-A-E
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A. First sketch or drawing			
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B. First disclosure to others			
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C. First written description			
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D. Completion of first model or full size device			
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E. first actual reduction to practice*			
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List project # and other pertinent notebook entries, photographs, reports, drawings VIP Project AH109341

If the invention was disclosed outside of Varian, identify the individuals, the companies or activities they represent, and the date of disclosure. Under NDA to Kanai Shah, Paul Bennett & Mike Squillante of RMD on June 27, 2002

List any known public use, publication, or oral presentation of the invention, sale or offer for sale(*see definitions)

	No	Yes	Date	Persons, Companies or Pub
A. Sold				
B. Offered for Sale as part of a Product*				
C. Offered for Sale in development program*				
D. Described in Publication*				
E. Submitted to Publication				
F. Placed in public use*				
G. Used in a product in public use				
H. Orally presented				

List dates and details of activities of 7.A-H if scheduled in future

Related Government Contract(s). Did your job assignments involve work under a Government contract related to the inventive subject matter at the time the invention was...

	No	Yes	Contract No.
Conceived	<input type="checkbox"/>	<input type="checkbox"/>	
First successfully tested	<input type="checkbox"/>	<input type="checkbox"/>	

See page 2 (Section 10 Instructions) The completed description should be signed by the inventor(s), and then read and signed by a technically competent witness, using the statement "DISCLOSED TO AN UNDERSTOOD BY ME THIS ____ DAY ____ OF ____ 20 ____." Drawings, sketches, photographs, reports, if available, may for a part of the disclosure, and reference thereto can be made to complete this description.

Recommended Security Classification of the invention

☐ Unclassified ☐ Confidential ☐ Secret ☐ Other _____

Signature(s) of Inventor(s) <i>Larry Partain</i>	Date 7/23/02	Signature of Witness <i>Andrew Jerry</i>	Date 7/23/02
Signature(s) of Inventor(s)	Date	Signature of Witness	Date


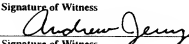
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<i>List all inventors, include full middle names. Use attached sheet if more than one inventor</i>				
2	Name & Title of Inventor(s) Mike Green <i>MICHAEL CURTIS GREEN</i> <small>(Please Print Name)</small>	Badge # 20193	Home Tele phone# 650.856 USA 7921	Country of Citizenship U.K.
	Home Address/Street 4055 MANZANA LANE, City PALO ALTO State CA Zip 94306			
3	Business Unit Name Gintzon Technology Center		Business Unit Address 2599 Garcia, Mountain View, CA 94043	
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12	Signature(s) of Inventor(s) <i>McGreen</i>		Date 7-23-02	
	Signature(s) of Inventor(s)		Date	
	Signature of Witness <i>Andrew Jerry</i>		Date 7/23/02	
	Signature of Witness		Date	

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2	Name & Title of Inventor(s) Steve Bandy	Badge # 01793	Home Tele phone# USA 408 7324505	Country of Citizenship U.S.
	Home Address/Street 590 Middlebury Dr.	City Sunnyvale	State CA	Zip 94087
3	Business Unit Name Gintzon Technology Center		Business Unit Address 2599 Garcia, Mountain View, CA 94043	
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2	Name & Title of Inventor(s) George Zentai	Badge # 30811	Home Tele phone 650 559 USA 8555	Country of Citizenship HUNGARY
	Home Address/Street 1054 Blackfield Way City Mountain View State CA Zip 94040			
	Business Unit Name Gintzon Technology Center		Business Unit Address 2599 Garcia, Mountain View, CA 94043	
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	Signature of Inventor(s) <i>G. Zentai</i>	Date 7/23/02	Signature of Witness <i>Andrew Jerry</i>	Date 7/23/02
	Signature of Inventor(s)	Date	Signature of Witness	Date

Reducing Dark Current Of Photoconductors Using Heterojunctions That Maintain High X-ray Sensitivity

Patent Disclosure

Inventors:

Mike Green, Steve Bandy,
George Zentai & Larry Partain
Varian Medical Systems

Varian Confidential

Date: 7/23/02

Inventors: *Larry Partain*

Michael S. Green

Steve Bandy

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medical systems

ginzton technology center

Read & Understood: *Andrew Jung* Date: 7/23/02

Invention Summary

- Dark current limits the usefulness of high X-ray sensitivity of photoconductor sensors. This dark current can be substantially reduced by using p/n heterostructures of photoconductors without the loss of their high sensitivity.

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Date: 7/23/02 Inventors: *Kang Park*

Stanbury

all in 100% free

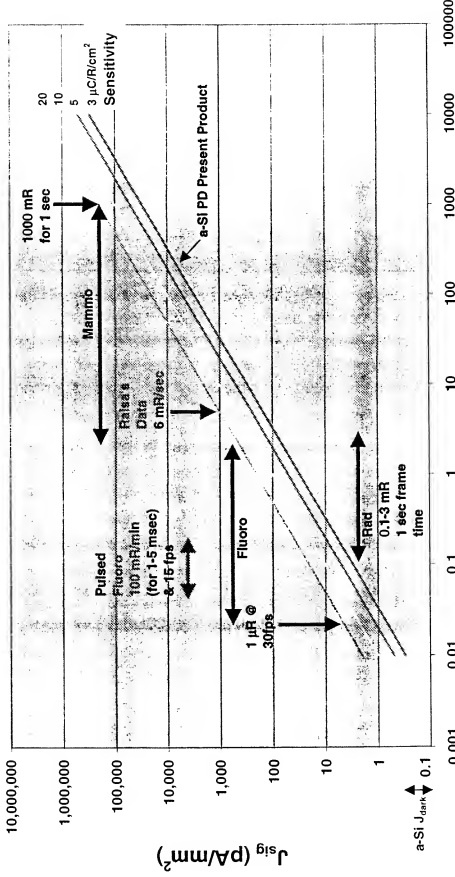
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Read & Understood: *Andrew Jang* Date: 7/24/01

PC Signal Current Vs Dose Rate

Dark current needs to be lower than signal current



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Date: 1/17/02

Inventors: *Larry D. Baker*
William C. Green
G. L. Smith

Read & Understood:

Andrew J. Perry

Date:

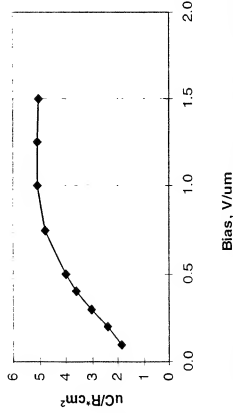
7/23/02

Good Sensitivity Requires Bias Of $\sim 0.5 - 1 \text{ V}/\mu\text{m}$

Hgl₂

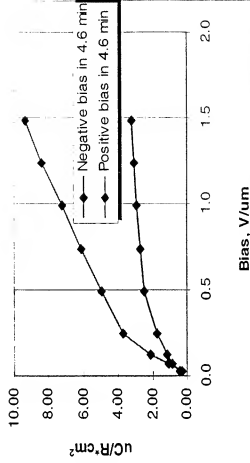
Sensitivity vs. negative bias @ 80 kVp,
1 mA

RTR Hgl₂ #7449 contact 7



Pbl₂

Sensitivity vs. bias @ 80 kVp, 1 mA
RMD Pbl₂ #739 contact 3



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Date: 7/23/02 Inventors: *Sam Banta*

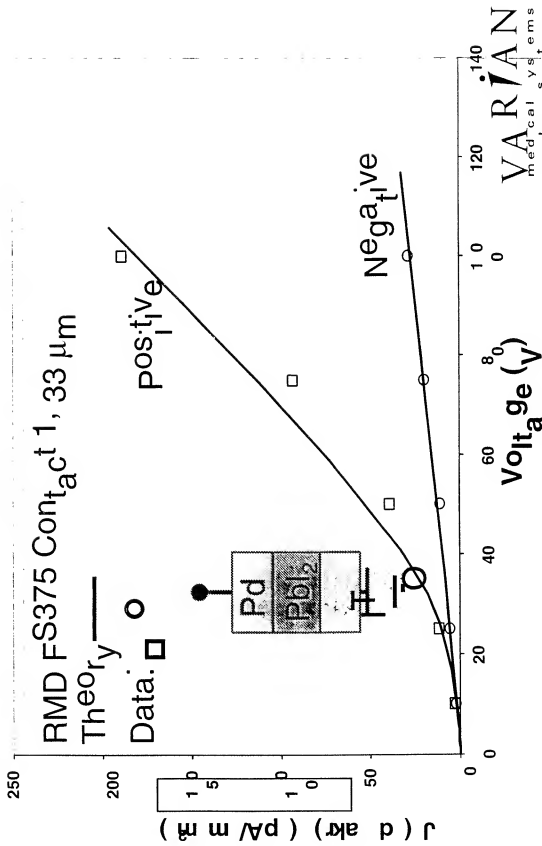
David L. et al. et al.

ginzton technology center

Read & Understood: *Andrew Jung* Date: 7/23/01

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PbI₂ Dark Current



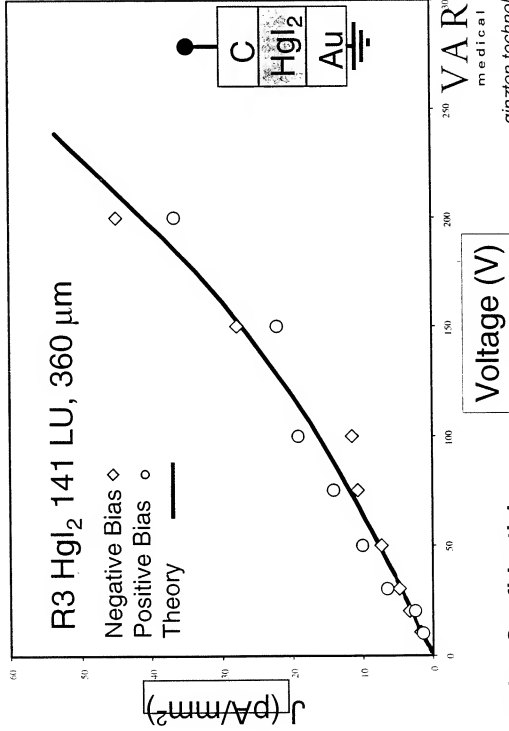
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Date: 7/23/02
 I v or
 n t s: *11/11/02*

Andrew J. D.

R_{ea}d & Un_{de}rstood. *Andrew J. D.* Date: 7/23/02

HgI₂ Dark Current



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Date: 7/23/02

Inventors: Larry Hunter
et al.

J. S. Smith

Read & Understood: *Andrew J. J. J.* Date: 7/23/02

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ginginton technology center

Dark Current Limits

$$E = \rho J$$

$$\text{For } E = 1 \text{ V}/\mu\text{m and } J_{\text{dark}} = 1 \text{ pA}/\text{mm}^2$$

$$\rho = 10^{14} \text{ Ohm-cm (Desired thin film value)}$$

$$\rho = 10^{12} \text{ Ohm-cm a-Si}$$

$$= 10^{12} \text{ Ohm-cm Se}$$

$$= 10^{12} \text{ Ohm-cm PbI}_2$$

$$= 10^{13} \text{ Ohm-cm HgI}_2$$

> Single Crystal Values

Polycrystalline thin films ρ unlikely
to exceed single crystal values

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Date: 7/23/02 Inventors:

Henry Darter
Michael C. Green

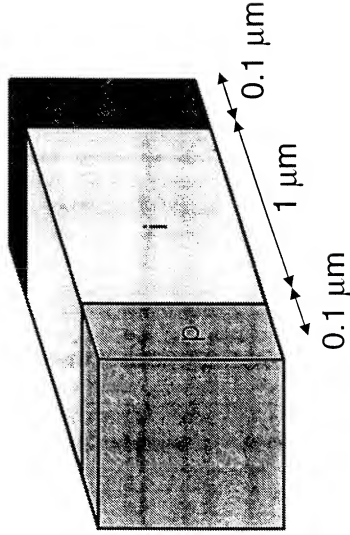
[Signature]

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Read & Understood: *Andrew Gyang* Date: 7/23/02

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Low Dark Current In a-Si Sensor Arrays



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Date: 7/23/02 Inventors: Gary Carter

elliot, J. P. C. et al.

[Signature]

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Read & Understood: *[Signature]* Date: 7/23/02

Heterojunction Structures

- Past experience
 - 1.2 eV p-Cu₂S/2.4 eV n-CdS (0.1-0.3 μm/30 μm)
 - Cu compensates “i” region in CdS (~1 μm)
 - High rectification ratio
 - Good “photodiode”
 - 10% efficient solar cell

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Date: 7/29/02 Inventors: *Sam Taylor*
allison p. p. 7.29.02

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[Signature]

Read & Understood: *Andrew Jung* Date: 7/23/02

Proposed Heterojunction Structures

- 2.3 eV p-PbI₂/2.1 eV n-HgI₂ (sublimated past)
 - Thickness combinations
 - Thick/Thin (e.g. 200 μm/50 μm)
 - Medium/Thin (e.g. 150 μm/350 μm)
 - Medium/Thick (e.g. 40 μm/350 μm or 10 μm/450 μm)
- 1.7 eV n-a-Si₁/3 eV p-PbI₂ (e.g. ~0.1 μm/200 μm)
- 1.7 eV p-a-Si₁/3 eV n-HgI₂ (e.g. ~0.1 μm/350 μm)
- Ad_n V₁ C V_r a_h a-Si₁
 - n_o end Sn W_{it} n a p

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m d'c l's t y s e m s

ginzt⁰ te hñ l o ogy ente^r

de^o rsto^o d. Andrew Jerry D^ate. 7/23/02

R ad & Un e

to am. 10/1/02

ar an Co l n t.

V₂ i nven r n d e i a l

Date: 1/2/02

Combine With Insulator Layers (or Insulator Alone)

- SiO_2
- $\text{SiO}_{2-x}\text{N}_x$
- Formed by dix before photoconductor deposition
- Several 100 Angstroms thick

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Date: 7/2/01 Inventor's Name: [Signature]

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Read & Understand [Signature] Date: 7/23/02